
**UNIVERSITI PUTRA MALAYSIA**

# *DECOMPOSITION ANALYSIS OF EFFICIENCY AND PRODUCTIVITY OF MALAYSIAN MANUFACTURING INDUSTRY*

**AZMAN HASSAN**

**FEP 2012 11**

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**DOCTOR OF PHILOSOPHY**
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**2012**

# DECOMPOSITION ANALYSIS OF EFFICIENCY AND PRODUCTIVITY OF MALAYSIAN MANUFACTURING INDUSTRY

**by**

**AZMAN HASSAN**



**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

**August 2012**

**DEDICATIONS**

**To My Father and Mother**

**Especially to**

**My Beloved Wife**

**Tengku Hanidza Tengku Ismail**

**And Our Children**

**Muhammad Hazwan**

**Siti Liyana**

**Muhammad Hirzan**

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

**DECOMPOSITION ANALYSIS OF EFFICIENCY AND PRODUCTIVITY OF MALAYSIAN MANUFACTURING INDUSTRY**

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**August 2012**

**Chairman: Associate Professor Zulkornain Yusop, PhD**

**Faculty: Economics and Management**

This study investigates the total factor productivity growth (TFPG) in Malaysia manufacturing industries over the period 1981 to 2006. The study period is divided into four sub-periods; pre-IMP 1981-1985, IMP 1986-1996, financial crisis 1997-1999, and post financial crisis 2000-2006. Analysis of the data involves two stages using the Stochastic Frontier Approach (SFA). The first stage involves the specification and estimation of the stochastic production function, followed by the tests for the specification of stochastic production functions. In the second stage, the selected specification of a regression model was used to predict technical efficiency effects. The sources of TFPG were decomposed into four components; technological progress (TP), technical efficiency (TE), scales effect (SC), and allocative efficiency (AE).

The average technical efficiency estimates at the 2-Digit level for the period 1981-1991 for all sectors was 0.7381. The highest estimate was the Food, Beverages and Tobacco (31) sector at 0.9107 and the lowest was the Wood Products and Furniture (33) sector at 0.6398. For the period 2000-2006 the technical efficiency was 0.9454.

The Pottery, China and Earthenware, Glass, and Non-metallic Mineral Products (36) sector ranked highest at 0.9684 while the Iron and Steel, and Non-Ferrous Basic Industries (37) sector was the lowest at 0.8639.

The average growth rate of TP for all sectors for periods 1982-1985, 1986-1996, 1997-1999, 1982-1999 and 2000-2006 were estimated at 0.0159, 0.0145, -0.0048, 0.015 and -0.0110 respectively. The data shows decreasing TP over the years. The highest computed average growth rate of technical efficiency (TE) was 0.0023 for periods 1982-1985 and 1986-1996 and the lowest in 1997-1999 at 0.0022. TE increased from 0.0023 to 0.0032 for periods 1982-1999 and 2000-2006. This implies that the output constitute 0.32% of the potential output given by the best performance of the industries. For periods 1982-1985, 1986-1996, 1997-1999, the estimated average growth rate of SC were 0.0066, 0.0057, and 0.0001 respectively. For periods1989 -1999 and 2000-2006, SC estimated at 0.0029 and 0.0017. For period 1982-1985, the average growth rate of AE were estimated at -0.0063 and declined to -0.0070 during 1986-1996 and reached -0.0209 in 1997-1999. AE were estimated at -0.0142 during 1982-1999 and increased to 0.0158 for 2000-2006 periods. For periods 1982-1985, 1986-1996, and 1997-1999, the average growth rate of TFP was 0.0185, 0.0155, and 0.0234 respectively. TFP for 1982-1999 and 2000-2006 was 0.0067 and 0.0096 respectively.

From the results, we can infer that the average growth in TFP was driven mainly by TP which has positive impact until the period of Asian financial crisis. Changes in TE and SC had a significant positive effect, while AE had a negative effect from year 1982 to 1999. Increases in TFPG for all the sectors are minimally or is negative

for the 2000-2006 which was adversely affected by deteriorating TP. The average growth rate of AE contributes the most compare to the other components TP, TE, and SC in the same period.

The policymakers can recommend better suited policies that improve the productivity of Malaysian manufacturing sector only if they understand the sources of variation in productivity growth. The proposed decomposition enables policymakers to trace lagging productivity to particular component and to target those that boost productivity. Among some of the policies that can be derived from all of the decomposition of TFPG are research and development (R&D) on improving TP, greater access to foreign market to exploit potential SC, managerial practices on improving TE as well as less government intervention on improving AE.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**ANALISIS PENGURAIAN BAGI KECEKAPAN DAN PRODUKTIVITI UNTUK SEKTOR PEMBUATAN MALAYSIA**

**Oleh**

**AZMAN HASSAN**

**Ogos 2012**

**Pengerusi: Profesor Madya Zulkornain Yusop, PhD**

**Fakulti: Ekonomi dan Pengurusan**

Kajian ini menyiasat pertumbuhan factor produktiviti menyeluruh (TFPG) industri pembuatan di Malaysia bagi tempoh 1981 hingga 2006. Jangka masa kajian ini dibahagikan kepada empat sub-tempoh; pra-IMP 1981-1985, IMP 1986-1996, krisis kewangan 1997-1999, dan selepas krisis kewangan 2000-2006. Analisis data melibatkan dua peringkat dengan menggunakan Pendekatan Stokastik Frontier (SFA). Peringkat pertama melibatkan spesifikasi dan anggaran fungsi pengeluaran stokastik diikuti dengan ujian untuk spesifikasi fungsi pengeluaran stokastik. Dalam peringkat kedua, spesifikasi model regrasi yang dipilih digunakan untuk meramalkan kesan kecekapan teknikal. Penguraian sumber TFPG dibahagikan kepada empat komponen; kemajuan teknologi (TP), kecekapan teknikal (TE), kesan skala (SC), dan kecekapan allokatif (AE).

Anggaran purata kecekapan teknikal pada tahap 2-Digit bagi tempoh 1981-1999 untuk semua sektor adalah 0.7381. Anggaran tertinggi adalah sektor Makanan, Minuman dan Tembakau (31) iaitu 0.9107 dan terendah adalah sektor Keluaran Kayu dan Perabut (33) iaitu 0.6398. Bagi tempoh 2000-2006 kecekapan teknikal adalah 0.9454. Sektor Pembuatan Periok Belanga, Tembikar dan Barangan Dari

Tanah Liat, Kaca dan Keluaran Galian bukan Logam (36) mempunyai nilai tertinggi iaitu 0.9684 manakala Industri Asas Besi dan Keluli, dan Logam Bukan Ferum (37) mempunyai adalah terendah iaitu 0.8639.

Anggaran kadar pertumbuhan purata TP bagi semua sektor bagi tempoh 1982-1985, 1986-1996, 1997-1999, 1982-1999 dan 2000-2006 ialah 0.0159, 0.0145, -0.0048, 0.015 dan -0.0110 masing-masing. Data menunjukkan TP tahunan berkurangan. Kiraan purata kadar pertumbuhan kecekapan teknikal (TE) tertinggi adalah 0.0023 bagi tempoh 1982-1985 dan 1986-1996 dan terendah pada tahun 1997-1999 iaitu 0.0022. TE meningkat dari 0.0023 ke 0.0032 untuk tempoh 1982-1999 dan 2000-2006. Ini menunjukkan bahawa output membentuk 0.32% daripada potensi keluaran yang diberikan oleh prestasi yang terbaik industri. Bagi tempoh 1982-1985, 1986-1996, 1997-1999, anggaran kadar pertumbuhan purata SC ialah 0.0066, 0.0057, dan 0.0001 masing-masing. Untuk tempoh 1989 -1999 dan 2000-2006, SC dianggarkan pada 0.0029 dan 0.0017. Bagi tempoh 1982-1985, kadar pertumbuhan purata AE dianggarkan pada -0.0063 dan menurun kepada -0.0070 pada tempoh 1986-1996 dan mencapai -0.0209 pada tempoh 1997-1999. Anggaran AE pada tempoh 1982-1999 ialah -0.0142 dan meningkat kepada 0.0158 bagi tempoh 2000-2006. Bagi tempoh 1982-1985, 1986-1996, dan 1997-1999, kadar pertumbuhan purata TFP adalah 0.0185, 0.0155, dan 0.0234 masing-masing. TFP bagi 1982-1999 dan 2000-2006 adalah 0.0067 dan 0.0096 masing-masing.

Daripada keputusan, kita boleh merumuskan bahawa purata pertumbuhan TFP telah didorong terutamanya oleh TP yang mempunyai kesan positif sehingga tempoh krisis kewangan Asian. Perubahan dalam TE dan SC mempunyai kesan posif yang ketara, manakala AE mempunyai kesan negative dari tahun 1981-1999. Peningkatan

dalam TFPG untuk semua sektor adalah minimum atau negatif bagi 2000-2006 yang telah terjejas teruk oleh kemerosotan TP. Kadar pertumbuhan purata AE adalah penyumbang terbanyak berbanding komponen lain, TP,TE, dan SC dalam jangka masa yang sama.

Pembuat dasar boleh mencadangkan dasar yang lebih sesuai untuk membaiki produktiviti sektor pembuatan di Malaysia jika mereka memahami sumber kelainan dalam pertumbuhan produktiviti. Cadangan penguraian membolehkan pembuat dasar untuk mengesan pengurangan produktiviti kepada komponen tertentu dan meransangnya untuk meningkatkan produktiviti. Antara dasar yang boleh digunakan daripada semua penguraian TFPG adalah penyelidikan dan pembangunan (R&D) untuk membaiki TP, akses lebih besar pasaran asing untuk mengekploitasi potensi SC, amalan pengurusan untuk membaiki TE, serta kurang campurtangan kerajaan untuk memperbaiki AE.

## ACKNOWLEDGEMENTS

I would like to take this opportunity to express my thanks and gratitude to the many people who helped makes this thesis a reality. First I would like to thank my thesis committee Associate Professor Dr Zulkornain Yusop, Professor Dr Khalid Abdul Rahim and Dr Zakariah Abdul Rashid. Their ideas or suggestions and help make it a meaningful part of this thesis. I am also very grateful to their guidance and continuous support throughout the process of writing this thesis. I am especially indebted to Associate Professor Dr Zulkornain Yusop for his role as the Chairman of my thesis committee.

My sincere gratitude to Universiti Putra Malaysia for granting me an opportunity to pursue my study. Without their financial support and study leave, this study would not have materialized. My thanks to the officers of the Department of Statistics, Malaysia for providing me access to the numerous data and records during the course of the study.

I would like to thank my family. To my wife, Tengku Hanidza Tengku Ismail, my children Muhammad Hazwan, Siti Liyana and Muhammad Hirzan, thank you for the support and understanding over the years when I have spent more time with this thesis than with them.

Last, but not least, to my parents who had given me the care and encouragement in the pursuit of life.

I certify that a Thesis Examination Committee has met on 14 August 2012 to conduct the final examination of Azman bin Hassan on his thesis entitled "Decomposition Analysis of Efficiency and Productivity of Malaysian Manufacturing Industry" in accordance with the Universities and University College Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the Doctor of Philosophy.

Members of the Examination Committee were as follows:

**Zaleha binti Mohd Noor, PhD**
Senior Lecturer
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

**Muzafar Shah Habibullah, PhD**
Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Internal Examiner)

**Alias bin Radam, PhD**
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Internal Examiner)

**Waridin, PhD**
Professor
Diponegoro University, Semarang
Indonesia
(External Examiner)

**SEOW HENG FONG, PhD**
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 23 January 2013

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirements for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows;

**Zulkornain Yusop, PhD**
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

**Khalid Abdul Rahim, PhD**
Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Member)

**Zakariah Abdul Rashid, PhD**
Executive Director
Malaysian Institute of Economic Research
(Member)



**BUJANG BIN KIM HUAT, PhD**
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, or is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



**AZMAN HASSAN**

Date: 14 August 2012

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